

We claim:

1. A pixel for use in a CMOS imaging array, said pixel having a PN photodiode comprising:

a semiconductor substrate having a first conductivity type; and

a well of a second conductivity type formed in the semiconductor substrate, the surface of said first well being passivated by a nitrogen dopant.

2. The pixel of Claim 1, wherein said nitrogen dopant extends down from said surface by about 100-500 angstroms.

3. The pixel of Claim 1, wherein said nitrogen dopant has a concentration of about 1×10^{14} to $1 \times 10^{16}/\text{cm}^2$.

4. The pixel of Claim 1, further including a silicon oxide layer over said first well.

5. The pixel of Claim 1, further including a silicon oxynitride layer over said first well.

6. The pixel of Claim 1, wherein said nitrogen dopant is introduced using ion implantation.

7. The pixel of Claim 1, wherein said nitrogen dopant is introduced using a thermal diffusion.

8. The pixel of Claim 1, wherein said nitrogen dopant is replaced with an oxygen, hydrogen or silicon dopant.

9. The pixel of Claim 8, wherein said oxygen dopant extends down from said surface by about 100-500 angstroms.

10. The pixel of Claim 8, wherein said oxygen dopant has a concentration of about 1×10^{14} to $1 \times 10^{16}/\text{cm}^2$.

11. The pixel of Claim 8, further including a silicon oxide layer over said first well.

12. The pixel of Claim 8, further including a silicon oxynitride layer over said first well.

13. A pixel for use in a CMOS image sensor comprising:

a PN photodiode, the surface of said PN photodiode being passivated with a nitrogen dopant implant;

a reset transistor coupled to the photodiode for resetting the signal level on the photodiode;

a buffer transistor, the gate of the buffer transistor being coupled to the output of the photodiode; and

a row select transistor, the gate of the row select transistor being coupled to a row select signal line, the input of the row select transistor being coupled to the output of the buffer transistor, and the output of the row select transistor providing the output of the pixel sensor cell.

14. The pixel of Claim 13, wherein said nitrogen dopant is replaced with an oxygen, hydrogen, or silicon dopant.

15. The pixel of Claim 13, wherein said nitrogen dopant extends down from said surface by about 100-500 angstroms.

16. The pixel of Claim 13, wherein said nitrogen dopant has a concentration of about 1×10^{14} to $1 \times 10^{16}/\text{cm}^2$.

17. The pixel of Claim 13, further including a silicon oxide layer over said first well.

18. The pixel of Claim 13, further including a silicon oxynitride layer over said first well.

19. A pixel for use in an image sensor comprising:

a PN photodiode;

a passivating silicon oxynitride layer formed over the surface of said PN photodiode;

a reset transistor coupled to the PN photodiode for resetting the signal level on the photodiode;

a buffer transistor, the gate of the buffer transistor being coupled to the output of the photodiode; and

a row select transistor, the gate of the row select transistor being coupled to a row select signal line, the input of the row select transistor being coupled to the output of the buffer transistor, and the output of the row select transistor providing the output of the pixel sensor cell.

20. A method for reducing dark current in a PN photodiode, said method comprising:

doping the surface of said PN photodiode with a nitrogen dopant.

21. The method of Claim 20 wherein said nitrogen dopant is replaced with an oxygen or silicon dopant.

22. The method of Claim 20, wherein doping of said surface further extends down from said surface by about 100-500 angstroms.

23. The method of Claim 20, wherein said nitrogen dopant has a concentration of about 1×10^{14} to $1 \times 10^{16}/\text{cm}^2$.

24. The method of Claim 20, further including forming a silicon oxide layer over said N-well.

25. The method of Claim 20, further including forming a silicon oxynitride layer over said N-well.

26. The method of Claim 19, further including performing an annealing process after said doping step.

27. A method for reducing dark current in a PN photodiode, said method comprising:

forming a silicon oxynitride layer on the surface of said PN photodiode.